

# **Near Term Deployment of Nuclear Plants in the United States**

**ANS Winter Meeting Reno,  
Nevada**









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**November 13, 2001**

# Presentation Overview

- ✎ **Strategic Context for Near Term Deployment of New Nuclear Energy Plants**
- ✎ **Mission and Process**
- ✎ **Generic Gaps and Issues**
- ✎ **Conclusions**
- ✎ **Recommendations**
  - ✎ **Phased Approach: Market-Driven, Dual Track**
  - ✎ **Economic Competitiveness**
  - ✎ **Nuclear Industry Infrastructure**
  - ✎ **National Nuclear Energy Strategy**
- ✎ **A Call to Action**

## **Strategic Context for Near Term Deployment**

-  **Increasing awareness of need for new generating capacity**
-  **Fossil fuel price volatility, clean air constraints**
-  **Excellent existing nuclear plant performance**
-  **Improving economics of new nuclear power plants**
-  **Industry consolidation = companies large enough to undertake large capital projects**
-  **Significant public (and political) support**
-  **Greater certainty in the licensing process**
-  **New National Energy Policy**

## Mission and Process

- **Mission - Identify the technical, institutional and regulatory gaps to the near term deployment of new nuclear plants and recommend actions that should be taken by DOE.**
- **Participants - multi-disciplined nuclear industry group**
  - ✎ Nuclear Utilities - Duke, Southern Nuclear, Exelon
  - ✎ Reactor Vendors - Westinghouse, General Electric, General Atomics
  - ✎ National Laboratories - ANL, INEEL
  - ✎ Academia - Penn State
  - ✎ Industry - EPRI/ Consultants
  - ✎ NERAC
- **Oversight by NERAC GRNS members**

## Mission and Process (continued)

- **Request for Information (RFI)**

- ✎ Issued April 4, 2001, to reactor designers, AEs, nuclear plant owners/operators, Gen IV participants, NEI New Plant Task Force members
- ✎ Public notice through Commerce Business Daily (CBD)
- ✎ Solicits identification of design-specific, site-related and generic barriers to deployment of new nuclear plants by 2010
- ✎ Responses received from 12 organizations

- **NTD Roadmap**

- ✎ Target completion date - October 31, 2001

## Mission and Process (continued)









### RFI requested information in two areas:

- ◆ **Specific Deployment Candidate Designs that meet six criteria**
  - Credible plan for gaining regulatory acceptance
  - Existence of industrial infrastructure
  - Credible plan for commercialization
  - Cost-sharing between industry and government
  - Demonstration of economic competitiveness
  - Reliance on existing fuel cycle structure
- ◆ **Generic & Design Specific Gaps**
  - Known gaps provided requiring ranking and possible solutions




Other gaps to be identified by respondent

## Mission and Process (continued)

- **Design Specific Responses**










 SW 1000	Framatome
 PBMR	Exelon/PBMR
 AP600	Westinghouse
 AP1000	Westinghouse
 IRIS	Westinghouse
 GT-MHR	General Atomics
 ABWR	General Electric
 ESBWR	General Electric

- **NTD Recognition of other potential candidate designs**

 System 80+	Westinghouse
 CANDU	
 EPR	Framatome

## Generic Gaps/Issues



### **Nine generic issues identified that could influence the viability and timing of any new nuclear plant project:**

-  Nuclear plant economic competitiveness
-  Business implications of the deregulated electricity marketplace
-  Efficient implementation of 10CFR52 (standardized licensing process)
-  Adequacy of nuclear industry infrastructure
-  National Nuclear Energy Strategy
-  Nuclear safety
-  Spent fuel management
-  Public acceptance of nuclear energy
-  Non-proliferation of nuclear material

 **First five are considered “gaps” to near term deployment for which specific recommendations are made**

# Summary Discussion of Gaps

## **Nuclear Plant Economic Competitiveness**





-  New nuclear plants must be economically competitive in de-regulated marketplace: the most significant challenge
-  Nuclear plants have significant long term financial advantage (low production costs). Issue for deployment: is nuclear's advantage enough to offset high capital costs?

## **Challenges/Opportunities of the De-regulated Electricity Marketplace:**

-  Fundamentally different business environment
  -  Risk for new projects squarely on investors
  -  Long lead times for nuclear plants make it difficult to respond to short term electricity market needs

# Summary Discussion of Gaps (continued)

## **Efficient Implementation of 10CFR52**

-  Regulatory process is source of business uncertainty
-  Improved Part 52 process: Early Site Permit (ESP), Design Certification (DC), and Combined License (COL)
-  Part 52 provides more opportunity for public input earlier in process; greater certainty that projects conforming to approvals will operate.
-  ESP & COL never exercised, posing risk to plant investors

## **Nuclear Industry Infrastructure**

-  Nuclear construction hiatus has led to aging workforce; atrophied manufacturing/construction infrastructure

## **National Nuclear Energy Strategy**

-  Current government backing for building new nuclear plants not adequate for near term deployment

## Conclusions




- ✍ **New nuclear plants can be deployed in the U.S. in this decade -- with sufficient, timely private sector investment**
- ✍ **To have new plants operating by 2010, O/Os must commit to orders by ~2003. Requires very near term action**
- ✍ **Economic competitiveness is key area of uncertainty**
- ✍ **Efficient implementation of Part 52 is most urgent**
- ✍ **Excellent candidates available. Certified designs ready; other candidates show promise for improved economics**
- ✍ **Achieving near term deployment will require close collaboration between industry and government.**

## Conclusions (continued)

- ✎ **Selections of new projects must be market driven and primarily supported by private sector investment, but government support is essential, in the form of:**
  - ✎ Leadership and effective policy
  - ✎ Efficient regulatory approvals
  - ✎ Cost sharing of generic and one-time costs
- ✎ **Industry-Government collaboration essential to success**
  - ✎ Will provide needed resource leveraging
  - ✎ Will greatly enhance investor confidence
  - ✎ Better standardization of designs and processes

## Recommendations -- an Overview





### **A “Phased Plan of Action” with three phases:**

-  Regulatory Approvals
-  Design Completion
-  Construction and Startup

### **“Dual Track” implementation for both ALWR & Gas-cooled**

-  Both tracks required to address different market scenarios






### **Market-driven initiatives, with DOE cost-sharing of regulatory-related generic & 1st-time design-specific costs**

-  DOE \$ only for initiatives that obtain  $\geq 50\%$  private sector funding
-  ESP and COL demonstrations
-  Design Certifications (ALWRs) and COLs w/o DC (gas reactors)
-  First Time Engineering Completion



### **Development of National Nuclear Energy Strategy to complement new National Energy Policy**

# Recommendations: A Phased Plan of Action

## **Phase 1: Regulatory Approvals**

-  Develop generic guidance for ESP, COL, ITAAC
-  Industry and DOE cost share (market-driven initiatives):
  -  ESP and COL applications to demonstrate processes
  -  Complete DC (FDAs for gas reactors) for selected designs
  -  Risk-informed, performance-based regulatory framework being developed (may be applied as elements become available)

## **Phase 2: Design Completion**

-  Complete detailed engineering for at least one design in each track (ALWR, gas-cooled) to allow deployment by 2010
  -  Industry and DOE cost share (market-driven initiatives)

## **Phase 3: Construction and Startup**

 privately funded but supported by appropriate government incentives








# Recommendations: Economic Competitiveness

- **Focus on minimizing “time to market”**
  - ✍ Efficient regulatory approvals by applicants and NRC
  - ✍ Expedite projects via parallel regulatory approvals & design completion; early procurement of long-lead components
- **Establish government incentives for business risk reduction:**
  - ✍ Encourage long term power purchase agreements
  - ✍ Accelerated depreciation
  - ✍ Tax credits for new investments
  - ✍ Tax incentives for fuel supply diversity and emission-free generation
  - ✍ Access to tax-exempt state government financing
  - ✍ Ensure energy/environmental policies & regs. are balanced

## Recommendations: Nuclear Industry Infrastructure




- **Expand/accelerate programs focused on most urgent personnel areas: construction, engineering, operations, health physics**
  - ✍ NEI survey will better define needs
  - ✍ DOE/Industry Matching Grant Program
  - ✍ ANS Task Force on Nuclear Workforce
  - ✍ NERAC Recommendations on Human Infrastructure
- **Industry & government cooperate on study of fabrication, manufacturing and construction infrastructure, both domestic and international**

## **Recommendations: Develop National Nuclear Energy Strategy**





-  **Build on support for nuclear in National Energy Policy**
-  **Articulate national security and environmental quality imperatives**
-  **Commit federal government to specific new plant goal (e.g., “Vision 2020” -- 50,000 MWe new nuclear capacity)**
-  **Commit federal government to nuclear energy supply R&D investment strategy that is in balance with that for other energy supply options**
-  **Expedite regulatory approvals consistent with safety regulations**
-  **Commit to market-driven, public private partnerships**
-  **Seek broad support from Congress**

## A CALL TO ACTION

### **Industry and Government must act together to enable new nuclear plant construction**

-  Technology options are safe, reliable, with competitive economic potential
-  National security requires greater energy independence
-  Environmental quality requires emission-free generation

### **Urgent need for aggressive, focused actions in 2002:**

-  Industry leadership & innovation (e.g., form consortia)
-  Regulatory foundation: NEI has key role, working w/NRC
-  Major increase in FY 03 DOE budget for NTD
-  Major increase in industry-DOE cooperation (e.g., C.A.)

### **Building new plants in the U.S. is single most important step toward re-vitalizing Nuclear Energy R&D**